REMARKS

The case has been amended to be in condition for allowance.

Claims 1-27 have been cancelled and replaced with new claims 28-54.

In a previous paper, applicants elected the embodiment of Figures 1-3. In the Official Action, claims 3, 7-12, 17-18, and 27 were withdrawn from consideration for being directed to a non-elected embodiment.

Applicants respectfully disagree and request reconsideration.

Claim 30 (corresponding to original claim 3) recites an elastic deformation. This feature is clearly shown in Figures 1a-1c.

Here, the circuit board is elastically deformed by wrapping it around the shaft. During the wrapping, electromechanical components are pressed into contact with the shaft 28 indicated by the arrows 30, and the reaction force from this contact is thereby supported by the circuit board 10. Since the wrapping also becomes a shell of the motor, also external forces are supported by the circuit board 10.

Claim 34 (prior claim 7) may not be as evident from Figures 1-3, but is shown in better detail in Figure 4.

Figure 4 is a partial figure of the earlier figures. Thus, the elected embodiment of Figures 1-3 provides that when

the circuit board is wrapped around the shaft of the motor, the circuit board will be elastically deformed creating elastic expansions within the plane of the circuit board as well as elastic compressions perpendicular to the surface. This occurs in particular in connection when components 22 are pressed against each other or other parts of the electromechanical system, e.g., the shaft 28. In Figure 1c, there is thus a small compression at the circuit board at the places, where the components 22 are attached to it. It is, however, small compared with the rest of the system, and is therefore not easily distinguishable with the scale of the Figures 1-3. Anyone skilled in the art, however, immediately realizes that such a compression is present in Figure 1c.

Similarly, the subject matter of Claims 9-10 is present in Figure 1c, Figure 2 and Figure 3.

In Figure 1c, the circuit board 19 is bent, which indeed is an elastic deflection. In Figure 2, the portion 32 is deflected, and in Figure 3, the circuit board is once again bent, which is an example of a deflection.

The subject matter of original claims 11 and 27 are also easily seen in Figure 2, where the component is placed between the bent portion 32 and the main circuit board 10. Anyone knows that such an arrangement will apply a spring force on the component.

The subject matter of original claim 12 is clearly seen in Figure 1c, where the printed circuit board 10 is indeed bent to become the sole casing of the motor. This is a crucial point of the invention, since the basic idea is that the casing shown in Figure 1c is all what will be provided and will anyway be enough for many miniature electromechanical applications. Perhaps this idea is so revolutionary that the Official Action even cannot even assimilate such construction principles at all. This would be a very clear evidence on that the present invention is absolutely novel.

The subject matter of claim 17 is evident from Figure 1c, which indeed shows a complete micromechanical motor, including driving elements 22, motor shaft 28, electronics 24-26, wiring 12 and casing, being the circuit board 10 itself. The motor does not at all present any conventional look, which is obvious since it represents an invention related to the entire structural arrangement!

The Official Action objected to the abstract.

Please see that a replacement abstract was provided in the preliminary amendment submitted when the case was filed. As this abstract is believed to be acceptable, reconsideration of this objection is solicited.

The new claims avoid the object-to phrase "characterized in that".

The Official Action rejected claims 1-2, 4-6, 13-16, and 19-26 under §112, first paragraph.

Specifically, the Official Action stated that the specification did not convey to one of skill in the art that applicants had possession of the claimed invention at the time the application was filed.

Applicants respectfully disagree. That the recited features of the invention were within applicants' claimed scope is clear as these claims are part of the application as originally filed.

Regarding the objected-to recitations, it is a general knowledge in the art of transducers, that transducers can be characterized as sensors, actuators or both at the same time. That is, transducer is a common name for actuators and sensors. It is also of general knowledge to anyone in the fields of transducers that a sensor transforms an external stimulus to another energy form, in most cases an electrical signal. It is also known that an actuator does the opposite, i.e., transforming a signal into another energy form. Accordingly, an electromechanical transducer is thus an actuator, transforming an electrical signal into a mechanical motion, and/or a sensor, transforming a mechanical motion into an electrical signal. By mentioning electromechanical transducers, anyone knows that this means either an electromechanical sensor or an electromechanical actuator. This definition is generally known and therefore also

described in detail in the "background" section of the present disclosure, just to give the non-skilled in the art some hints of the terminology used. The passage of claim 1 mentioning this was added in the PCT phase only to clarify the terminology to the PCT Examiner. It does not add or restrict anything of the actual scope of the claim.

Applicants are not really sure why this rejection has been raised. However, see that the language of new independent claim 28 has been revised from that of original claim 1 in an effort to address what applicants understand to be the basis of this rejection.

Reconsideration and withdrawal of this rejection is requested.

The Official Action rejected claims 14-16 and 23-25 under §112, second paragraph.

In drafting the new claims, the objected-to recitations have been revised so as to remedy the stated basis of rejection. Withdrawal of the rejection is therefore solicited.

The Official Action rejected claims 1-2, 4-6, 13-16, and 19-26 as anticipated by MENY et al. 5,170,326.

Applicants respectfully disagree. In review, the present invention deals with the reduction of parts and simplifying of the assembly. This is achieved by using the flexible printed circuit board not only for electrical connections and for holding the individual components thereto,

but also as the dominating portion of the mechanical structure keeping the transducer system together.

Most structural parts, serving only as a support for the entire system is eliminated by letting the printed circuit board also perform an overall mechanical support for the entire system. This property was expressed as a "main structural member". "Main" having the meaning of major part, principal, dominating or most important, and "structural" having the meaning of means for supporting or essential framework.

The Official Action stated that MENY et al. disclose an electronic module assembly capable of being a transducer microsystem. In the definition, a transducer system is based on an interaction with the surroundings, and it is clear that the MENY et al. disclosure serves the opposite object, namely to protect the electronic components from the surroundings.

Although the MENY et al. disclosure may be used as the electronics part of a transducer system, in such a case an additional structural member of the remaining transducer system has to be used.

The Official Action states that the flexible printed circuit board is a "main structural member" of the MENY et al. assembly. Applicants strongly disagree.

In applicants' use of the recitation, the main structural member would instead be all or at least one of the items 52, 56 and 58. The flexible printed circuit board is only

attached to the base plate 52 and does not by itself contribute to the structural support of the entire system, at least not in a dominating manner.

The Official Action further states that the components 17 of MENY et al. are components of an electromechanical transducer.

As discussed above, there are no indications pointing in the direction that the MENY et al. assembly would be an electromechanical transducer system. On the contrary, since electromechanical transducers are involved in the transforming of electrical signals to mechanical motion and vice versa, there has to be some kind of mechanical connection between at least one component and some external items. However, the assembly of MENY et al. does only provide electrical connections to the components. Therefore, it is extremely unlikely that any of the components of MENY et al. is an electromechanical component.

Clearly item 17 cannot be a sensor for transforming a mechanical motion into an electrical signal. According to the above arguments, there are no indications for this, since the component 17 eventually is entirely encapsulated by the structural members 52, 56, 58 and cannot be reached by an external mechanical motion.

In order to advance the case, the recitations have been amended.

Firstly, claim 28 is thus drafted to clarify the intended definition of "main structural member". This amendment is supported by at least the summary, page 3, lines 26-30, the description, page 5, lines 17-19, the reference, page 6, lines 7-10, referring to the background description, page 3, lines 1-10.

Secondly, the claims specify the component to be an electromechanical component, so that a mechanical interaction with the surroundings has to be present. An example of such a component is the piezoelectric drive unit 22, mentioned allover the description.

Claim 29 is drafted according to the new use of electromechanical transducer in claim 28. This revision will also remove any possibility to misinterpret the associations with original claim 2.

The Official Action seems to have interpreted the "and/or" to separate "sensors" from the remaining part of the sentence, while the description clearly indicates that also the sensors have to be of one of the specified types. With the revision, such a misinterpretation will be impossible, and MENY et al. obviously do not disclose any parts having piezoelectric, electrostrictive or shape memory properties.

The Official Action also states, in connection with original claims 4, 6, 20 and 26, that MENY et al. disclose an elastic deformation to apply an elastic contact force to at least one of the components.

The stated reference (column 2, lines 43-55) does not discuss this matter at all. The flexible printed circuit board may very well be elastically deformed during the described bending. However, any elastic forces provided by this bending strives to straighten the board out, i.e., are directed out from the board towards the base plate 52. Such an elastic force can therefore not exert any contact force to the components, which are situated inside the enclosure. It is also very clearly described in MENY et al. that all contacts between the components and the flexible printed circuit board are arranged before the bending takes place.

Applicants therefore strongly disagree with the Official Action that there might be any contacting performed by using the elastic forces of a deformed flexible printed circuit board.

In redrafting claim 17, the new claim clarifies the similarities with original claim 1 in a more evident manner, since an electromechanical motor is a preferred embodiment of a transducer microsystem according to the present invention.

It is important to consider the recitations of the claims and the basic principles of the present invention. Although, there might in a first glance be some similarities in the geometrical shaping of the assemblies, and of the assembly procedure, the claims remain patentable. Both systems are mainly provided with components in a flat condition and are subsequently

bent to adopt the final shape. However, the use of the flexible circuit board is entirely different between the two systems. In MENY et al., the board is only used in the traditional manner for mounting components on, while the main mechanical structure is provided with other conventional means. In the present invention, the flexible board has still its conventional purpose, but is additionally used also for providing the overall framework of the entire system. This is absolutely distinct from any ideas presented in MENY et al.

The withdrawn claim 3 (now claim 30) is a further specification of the purpose of the flexible printed circuit board, exactly in line with what claim 1 is intended to indicate. Furthermore, original claim 4 is a direct continuation of claim 3, specifying the particularities of the elastic deformation. Therefore, applicants consider the withdrawn and examined claims to be very closely connected and we ask for reconsideration and examination of all the claims.

Withdrawal of the anticipation rejection and allowance of all the claims are respectfully requested.

Respectfully submitted,

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